

We Claim:

1. A method for producing a buried strap contact in a trench capacitor having a polysilicon core and a collar oxide surrounding the polysilicon core, which comprises the steps of:

providing a silicon substrate having a depression formed therein, the trench capacitor with the polysilicon core and the collar oxide being disposed in the depression;

introducing a mask layer into the depression;

patterning the mask layer with an ion beam being directed obliquely onto the depression at an angle for irradiating the mask layer only in an irradiated subregion of the depression resulting in a removal of the mask layer in the irradiated subregion, the collar oxide being partially exposed during the irradiating;

back etching exposed areas of the collar oxide along the polysilicon core using the mask layer as an etching mask resulting in a back etched collar oxide; and

forming a polysilicon layer in a region of the back etched collar oxide to produce the buried strap contact for the polysilicon core of the trench capacitor.

2. The method according to claim 1, which further comprises etching away part of the collar oxide from a top of the polysilicon core in the depression before performing the introducing step.
3. The method according to claim 1, which further comprises: forming the mask layer with a top liner layer and a bottom liner layer, and the ion beam patterning the top liner layer; and transferring a pattern of the top liner layer to the bottom liner layer with an etching process.
4. The method according to claim 1, which further comprises forming the collar oxide to cover sidewalls of the depression and the ion beam patterns the mask layer such that the mask layer is removed on a side wall of the depression at least down to a level above a top of the polysilicon core which corresponds to a width of the collar oxide.
5. The method according to claim 1, which further comprises depositing an  $Si_3N_4$  layer having a thickness of approximately 5-10 nm into the depression for forming the mask layer to be patterned by the ion beam.

6. The method according to claim 1, which further comprises generating the ion beam with a reactive ion beam etching source.

7. A method for producing a buried strap contact for a trench capacitor having a polysilicon core and a core oxide surrounding the polysilicon core, which comprises the steps of:

providing a silicon substrate having a depression formed therein, the trench capacitor with the polysilicon core and the collar oxide being disposed in the depression;

etching back the collar oxide along the polysilicon core;

forming a polysilicon layer on a bottom of the depression;

introducing a mask layer into the depression;

patterning the mask layer with an ion beam being directed obliquely onto the depression at an angle for irradiating the mask layer only in an irradiated subregion of the depression for removing the mask layer in the irradiated subregion, the polysilicon layer being partially exposed during the irradiating resulting in an exposed polysilicon layer;

back etching the exposed polysilicon layer down to the collar oxide using the mask layer as an etching mask to define the buried strap contact for the polysilicon core of the trench capacitor in a region of a remaining polysilicon layer; and

filling the depression with an oxide layer.

8. The method according to claim 7, which further comprises etching the collar oxide for removing the collar oxide from a top of the polysilicon core.

9. The method according to claim 7, which further comprises providing the silicon substrate with a plurality of depressions formed therein all having a standard geometry.

10. The method according to claim 7, which further comprises depositing an  $\text{Si}_3\text{N}_4$  layer having a thickness of approximately 5-10 nm into the depression for forming the mask layer to be patterned by the ion beam.

11. The method according to claim 7, which further comprises generating the ion beam with a reactive ion beam etching source.